CloudSat Project

A NASA Earth System Science Pathfinder Mission

2B-FLXHR-LIDAR Interface Control Document

Algorithm Version: 5.2 (12 December 2011)
2B-FLXHR-LIDAR Product Version: 008 (12 December 2011)

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1. I/O Lists

1.1 Algorithm Inputs

	Source	Field
(1)	ECMWF-AUX 008	Atmospheric pressure
(2)	ECMWF-AUX 008	Temperature
(3)	ECMWF-AUX 008	Specific humidity
(4)	ECMWF-AUX 008	Ozone
(5)	ECMWF-AUX 008	Skin temperature
(6)	MODIS-AUX 007	Solar zenith angle at the MODIS pixel
(7)	2B-GEOPROF 011	Seconds since the start of the granule.
(8)	2B-GEOPROF 011	UTC seconds since 00:00 Z of the first profile
(9)	2B-GEOPROF 011	TAI time for the first profile.
(10)	2B-GEOPROF 011	Spacecraft Latitude
(11)	2B-GEOPROF 011	Spacecraft Longitude
(12)	2B-GEOPROF 011	Height of range bin in Reflectivity/Cloud Mask above reference surface (~ mean sea level).
(13)	2B-GEOPROF 011	Digital Elevation Map
(14)	2B-GEOPROF 011	Location of Surface Bin as determined by 1B CPR algorithm. The value here is shifted (as Height).
(15)	2B-CWC-RO 008	Radar-only Liquid Effective Radius
(16)	2B-CWC-RO 008	Radar-only Liquid Effective Radius Uncertainty
(17)	2B-CWC-RO 008	Radar-only Ice Effective Radius
(18)	2B-CWC-RO 008	Radar-only Ice Effective Radius Uncertainty
(19)	2B-CWC-RO 008	Radar-only Liquid Water Content
(20)	2B-CWC-RO 008	Radar-only Liquid Water Content Uncertainty
(21)	2B-CWC-RO 008	Radar-only Ice Water Content
(22)	2B-CWC-RO 008	Radar-only Ice Water Content Uncertainty
(23)	2B-CWC-RO 008	Radar-only Ice Phase Fraction
(24)	2B-CWC-RO 008	Combined Radar-only Status
(25)	2B-CWC-RO 008	Radar-only Liquid Water Path
(26)	2B-CWC-RO 008	Radar-only Ice Water Path
(27)	2B-GEOPROF-LIDAR 003	Cloud Fraction
(28)	2B-GEOPROF-LIDAR 003	Number of hydrometeor layers
(29)	2B-GEOPROF-LIDAR 003	Height of Layer Base
(30)	2B-GEOPROF-LIDAR 003	Height of layer top
(31)	FLXHR-LIDAR-AUX 000	Optical Depth
(32)	FLXHR-LIDAR-AUX 000	Number of Layers in Type 1
(33)	FLXHR-LIDAR-AUX 000	Pixels in Layer
(34)	FLXHR-LIDAR-AUX 000	Cloud Classification
(35)	FLXHR-LIDAR-AUX 000	Layer Type
(36)	FLXHR-LIDAR-AUX 000	Calipso Optical Depth for thin cirrus

	Source	Field
(37)	FLXHR-LIDAR-AUX 000	Calipso horizontal averaging
(38)	FLXHR-LIDAR-AUX 000	Aerosol Layer Base
(39)	FLXHR-LIDAR-AUX 000	Aerosol Layer Top
(40)	FLXHR-LIDAR-AUX 000	Aerosol Feature Classifiaction Flags
(41)	FLXHR-LIDAR-AUX 000	Aerosol Optical Depth 532 nm
(42)	2B-TAU 008	Column cloud optical depth
(43)	2B-TAU 008	mean cloud effective radius
(44)	2B-CWC-RVOD 008	Radar/VOD Ice Phase Fraction
(45)	2B-CWC-RVOD 008	Combined Radar/VOD Status
(46)	2B-CWC-RVOD 008	Liquid-only Radar/VOD Effective Radius
(47)	2B-CWC-RVOD 008	Liquid-only Radar/VOD Effective Radius Uncertainty
(48)	2B-CWC-RVOD 008	Liquid-only Radar/VOD Liquid Water Content
(49)	2B-CWC-RVOD 008	Liquid-only Radar/VOD Liquid Water Content Uncertainty
(50)	2B-CWC-RVOD 008	Liquid-only Radar/VOD Liquid Water Path
(51)	2B-CWC-RVOD 008	Ice-only Radar/VOD Effective Radius
(52)	2B-CWC-RVOD 008	Ice-only Radar/VOD Effective Radius Uncertainty
(53)	2B-CWC-RVOD 008	Ice-only Radar/VOD Ice Water Content
(54)	2B-CWC-RVOD 008	Ice-only Radar/VOD Ice Water Content Uncertainty
(55)	2B-CWC-RVOD 008	Ice-only Radar/VOD Ice Water Path
(56)	AMSR-AUX 000	Surface Type
(57)	2C-PRECIP-COLUMN 001	Rain_top_height
(58)	2C-PRECIP-COLUMN 001	Freezing_level
(59)	2C-PRECIP-COLUMN 001	Precip_flag
(60)	2C-PRECIP-COLUMN 001	Rain Liquid Water Path
(61)	2C-PRECIP-COLUMN 001	Cloud Liquid Water Path
(62)	2C-PRECIP-COLUMN 001	Diagnostic_retrieval_info

1.2 Products

1.2.1 2B-FLXHR-LIDAR 008 Fields

	Source	Field
(1)	2B-GEOPROF 011	Seconds since the start of the granule.
(2)	2B-GEOPROF 011	UTC seconds since 00:00 Z of the first profile
(3)	2B-GEOPROF 011	TAI time for the first profile.
(4)	2B-GEOPROF 011	Spacecraft Latitude
(5)	2B-GEOPROF 011	Spacecraft Longitude
(6)	2B-GEOPROF 011	Height of range bin in Reflectivity/Cloud Mask above reference surface (~ mean sea level).
(7)	2B-GEOPROF 011	Range to the CPR boresight intercept with the geoid
(8)	2B-GEOPROF 011	Digital Elevation Map
(9)	2B-GEOPROF 011	
(10)	2B-GEOPROF 011	Nominal satellite pitch angle offset from nadir

	Source	Field
(11)	2B-GEOPROF 011	Nominal satellite roll angle offset from nadir
(12)	2B-GEOPROF 011	Data Quality
(13)	2B-GEOPROF 011	Data status flags
(14)	2B-GEOPROF 011	CPR bus orientation (target ID)
(15)	2B-FLXHR-LIDAR 008	Downwelling fluxes
(16)	2B-FLXHR-LIDAR 008	Downwelling clear sky flux profiles
(17)	2B-FLXHR-LIDAR 008	Downwelling Fluxes without aerosol
(18)	2B-FLXHR-LIDAR 008	Upwelling fluxes
(19)	2B-FLXHR-LIDAR 008	Upwelling clear sky flux profiles
(20)	2B-FLXHR-LIDAR 008	Upwelling Fluxes with no Aerosol
(21)	2B-FLXHR-LIDAR 008	Heating rates
(22)	2B-FLXHR-LIDAR 008	Column-integrated radiative heating
(23)	2B-FLXHR-LIDAR 008	TOA cloud radiative effect
(24)	2B-FLXHR-LIDAR 008	BOA cloud radiative effect
(25)	2B-FLXHR-LIDAR 008	RVOD Status flag
(26)	2B-FLXHR-LIDAR 008	Lidar status flag
(27)	2B-FLXHR-LIDAR 008	Flux and heating rate quality status
(28)	2B-FLXHR-LIDAR 008	Bin counter
(29)	2B-FLXHR-LIDAR 008	Mean solar insolation at TOA
(30)	2B-FLXHR-LIDAR 008	Standard deviation of solar insolation
(31)	2B-FLXHR-LIDAR 008	Mean outgoing shortwave radiation
(32)	2B-FLXHR-LIDAR 008	Standard deviation of outgoing shortwave radiation
(33)	2B-FLXHR-LIDAR 008	Mean surface shortwave radiation
(34)	2B-FLXHR-LIDAR 008	Standard deviation of surface shortwave radiation
(35)	2B-FLXHR-LIDAR 008	Mean reflected shortwave radiation at surface
(36)	2B-FLXHR-LIDAR 008	Standard deviation of reflected shortwave radiation at surface
(37)	2B-FLXHR-LIDAR 008	Mean outgoing longwave radiation
(38)	2B-FLXHR-LIDAR 008	Standard deviation of outgoing longwave radiation
(39)	2B-FLXHR-LIDAR 008	Mean surface longwave radiation
(40)	2B-FLXHR-LIDAR 008	Standard deviation of surface longwave radiation
(41)	2B-FLXHR-LIDAR 008	Mean emitted longwave radiation at surface
(42)	2B-FLXHR-LIDAR 008	Standard deviation of emitted longwave radiation at surface
(43)	2B-FLXHR-LIDAR 008	Mean integrated atmospheric longwave heating
(44)	2B-FLXHR-LIDAR 008	Standard deviation of atmospheric longwave heating
(45)	2B-FLXHR-LIDAR 008	Mean integrated atmospheric shortwave heating
(46)	2B-FLXHR-LIDAR 008	Standard deviation of atmospheric shortwave heating
(47)	2B-FLXHR-LIDAR 008	Solar Zenith Angle
(48)	2B-FLXHR-LIDAR 008	Land Characteristic
(49)	2B-FLXHR-LIDAR 008	Visible Albedo
(50)	2B-FLXHR-LIDAR 008	

2. Input Field Specifications

(1) Atmospheric pressure

Name in file: Pressure
Source: ECMWF-AUX 008
Field type (in file): REAL(4)
Field type (in algorithm): REAL(8)
Dimensions: nbin,nray
Units: Pa
Range: to
Missing value: -999
Missing value operator: ==
Factor: 1
Offset: 0
MB: 17.349

(2) Temperature

Name in file: Temperature
Source: ECMWF-AUX 008
Field type (in file): REAL(4)
Field type (in algorithm): REAL(8)
Dimensions: nbin,nray
Units: K
Range: to
Missing value: -999
Missing value operator: ==
Factor: 1
Offset: 0
MB: 17.349

(3) Specific humidity

Name in file: Specific_humidity
Source: ECMWF-AUX 008
Field type (in file): REAL(4)
Field type (in algorithm): REAL(8)
Dimensions: nbin,nray
Units: kg/kg
Range: to
Missing value: -999
Missing value operator: ==
Factor: 1
Offset: 0
MB: 17.349

(4) Ozone

Name in file: Ozone
Source: ECMWF-AUX 008
Field type (in file): REAL(4)
Field type (in algorithm): REAL(8)
Dimensions: nbin,nray
Units: kg/kg
Range: to
Missing value: -999
Missing value operator: ==
Factor: 1
Offset: 0
MB: 17.349

(5) Skin temperature

Name in file: Skin_temperature
Range: to

Source: ECMWF-AUX 008 **Missing value:** -999
Field type (in file): REAL(4) **Missing value operator:** ==
Field type (in algorithm): REAL(4) **Factor:** 1
Dimensions: nray **Offset:** 0
Units: K **MB:** 0.139

Skin temperature.

(6) Solar zenith angle at the MODIS pixel

Name in file: Solar_zenith **Range:** 0 to 18000
Source: MODIS-AUX 007 **Missing value:** -32767
Field type (in file): INT(2) **Missing value operator:** ==
Field type (in algorithm): INT(2) **Factor:** 1
Dimensions: mod_1km,nray **Offset:** 0
Units: degrees **MB:** 1.041

This is the solar zenith angle as measured at the location of the MODIS pixel. It is stored in a 2-byte signed integer and must be divided by 100 before use.

(7) Seconds since the start of the granule.

Name in file: Profile_time **Range:** 0 to 6000
Source: 2B-GEOPROF 011 **Missing value:**
Field type (in file): REAL(4) **Missing value operator:**
Field type (in algorithm): REAL(4) **Factor:** 1
Dimensions: nray **Offset:** 0
Units: seconds **MB:** 0.139

Seconds since the start of the granule for each profile. The first profile is 0.

(8) UTC seconds since 00:00 Z of the first profile

Name in file: UTC_start **Range:** 0 to 86400
Source: 2B-GEOPROF 011 **Missing value:**
Field type (in file): REAL(4) **Missing value operator:**
Field type (in algorithm): REAL(4) **Factor:** 1
Dimensions: <scalar> **Offset:** 0
Units: seconds **MB:** 0

The UTC seconds since 00:00 Z of the first profile in the data file.

(9) TAI time for the first profile.

Name in file: TAI_start **Range:** 0 to 6e+008
Source: 2B-GEOPROF 011 **Missing value:**
Field type (in file): REAL(8) **Missing value operator:**

Field type (in algorithm): REAL(8) **Factor:** 1
Dimensions: <scalar> **Offset:** 0
Units: seconds **MB:** 0

The TAI timestamp for the first profile in the data file. TAI is International Atomic Time: seconds since 00:00:00 Jan 1 1993.

(10) Spacecraft Latitude

Name in file: Latitude **Range:** -90 to 90
Source: 2B-GEOPROF 011 **Missing value:**
Field type (in file): REAL(4) **Missing value operator:**
Field type (in algorithm): REAL(4) **Factor:** 1
Dimensions: nray **Offset:** 0
Units: degrees **MB:** 0.139

Spacecraft Geodetic Latitude.

(11) Spacecraft Longitude

Name in file: Longitude **Range:** -180 to 180
Source: 2B-GEOPROF 011 **Missing value:**
Field type (in file): REAL(4) **Missing value operator:**
Field type (in algorithm): REAL(4) **Factor:** 1
Dimensions: nray **Offset:** 0
Units: degrees **MB:** 0.139

Spacecraft geodetic longitude

(12) Height of range bin in Reflectivity/Cloud Mask above reference surface (~ mean sea level).

Name in file: Height **Range:** -5000 to 30000
Source: 2B-GEOPROF 011 **Missing value:** -9999
Field type (in file): INT(2) **Missing value operator:** ==
Field type (in algorithm): INT(2) **Factor:** 1
Dimensions: nbin,nray **Offset:** 0
Units: m **MB:** 8.674

Height of the radar range bins in meters above mean sea level.

(13) Digital Elevation Map

Name in file: DEM_elevation **Range:** -9999 to 8850
Source: 2B-GEOPROF 011 **Missing value:** 9999
Field type (in file): INT(2) **Missing value operator:** ==
Field type (in algorithm): INT(2) **Factor:** 1

Dimensions: nray **Offset:** 0
Units: meters **MB:** 0.069

Elevation in meters above Mean Sea Level. A value of -9999 indicates ocean. A value of 9999 indicates an error in calculation of the elevation.

(14) Location of Surface Bin as determined by 1B CPR algorithm. The value here is shifted (as Height).

Name in file: SurfaceHeightBin **Range:** 1 to 125
Source: 2B-GEOPROF 011 **Missing value:** -1
Field type (in file): INT(1) **Missing value operator:** ==
Field type (in algorithm): INT(1) **Factor:** 1
Dimensions: nray **Offset:** 0
Units: **MB:** 0.035

Location of Surface Bin as determined by 1B CPR algorithm. The value here is shifted (as is the Height matrix) so bins in neighboring rays are about the same height.

(15) Radar-only Liquid Effective Radius

Name in file: RO_liq_effective_radius **Range:** 0 to 1000
Source: 2B-CWC-RO 008 **Missing value:** -333.3
Field type (in file): INT(2) **Missing value operator:** <=
Field type (in algorithm): REAL(4) **Factor:** 0.1
Dimensions: nbin,nray **Offset:** 0
Units: um **MB:** 8.674

RO retrieved profile of liquid effective radius r_e, obtained by performing a radar-only retrieval assuming the entire profile is liquid, and zeroing out the portion of the profile with temperatures colder than Temp_min_mixph_K (presumed to be pure ice).

Fill values:
0.0: Clear column (2B-GEOPROF)
-333.3: Solution negative (2B-LWC-RO)
-444.4: Solution diverged (2B-LWC-RO)
-777.7: Unphysical, bad, or missing reflectivity factor Z' (2B-GEOPROF)
-888.8: Cloud scenario not determined, invalid class, or class bad/missing (2B-CLDCLASS)
-999.9: Bad or missing temperature (ECMWF-AUX)

(16) Radar-only Liquid Effective Radius Uncertainty

Name in file: RO_liq_effective_radius_uncertainty **Range:** 0 to 250
Source: 2B-CWC-RO 008 **Missing value:** 253
Field type (in file): UINT(1) **Missing value operator:** >=
Field type (in algorithm): REAL(4) **Factor:** 1
Dimensions: nbin,nray **Offset:** 0

Units: % **MB:** 4.337

Fractional uncertainty in the RO retrieved liquid r_e (from the liquid-only retrieval), expressed in percent and rounded to the nearest integer. A value of 250 indicates an uncertainty >= 250%.

Fill values:
0: Clear column (2B-GEOPROF)
253: Solution negative (2B-LWC-RO)
253: Solution diverged (2B-LWC-RO)
253: Unphysical, bad, or missing reflectivity factor Z' (2B-GEOPROF)
254: Cloud scenario not determined, invalid class, or class bad/missing (2B-CLDCLASS)
253: Bad or missing temperature (ECMWF-AUX)

(17) Radar-only Ice Effective Radius

Name in file: RO_ice_effective_radius **Range:** 0 to 3000
Source: 2B-CWC-RO 008 **Missing value:** -333.3
Field type (in file): INT(2) **Missing value operator:** <=
Field type (in algorithm): REAL(4) **Factor:** 0.1
Dimensions: nbin,nray **Offset:** 0
Units: um **MB:** 8.674

RO retrieved profile of ice effective radius r_e, obtained by performing a radar-only retrieval assuming the entire profile is ice, and zeroing out the portion of the profile with temperatures warmer than Temp_max_mixph_K (presumed to be pure liquid).

Fill values:
0.0: Clear column (2B-GEOPROF)
-333.3: Solution negative (2B-IWC-RO)
-444.4: Solution diverged (2B-IWC-RO)
-777.7: Unphysical, bad, or missing reflectivity factor Z' (2B-GEOPROF)
-888.8: Cloud scenario not determined, invalid class, or class bad/missing (2B-CLDCLASS)
-999.9: Bad or missing temperature (ECMWF-AUX)

(18) Radar-only Ice Effective Radius Uncertainty

Name in file: RO_ice_effective_radius_uncertainty **Range:** 0 to 250
Source: 2B-CWC-RO 008 **Missing value:** 253
Field type (in file): UINT(1) **Missing value operator:** >=
Field type (in algorithm): REAL(4) **Factor:** 1
Dimensions: nbin,nray **Offset:** 0
Units: % **MB:** 4.337

Fractional uncertainty in the RO retrieved ice r_e (from the ice-only retrieval), expressed in percent and rounded to the nearest integer. A value of 250 indicates an uncertainty >= 250%.

Fill values:

0: Clear column (2B-GEOPROF)
253: Solution negative (2B-IWC-RO)
253: Solution diverged (2B-IWC-RO)
253: Unphysical, bad, or missing reflectivity factor Z' (2B-GEOPROF)
254: Cloud scenario not determined, invalid class, or class bad/missing (2B-CLDCLASS)
253: Bad or missing temperature (ECMWF-AUX)

(19) Radar-only Liquid Water Content

Name in file: RO_liq_water_content	**Range:** 0 to 15000
Source: 2B-CWC-RO 008	**Missing value:** -3333
Field type (in file): INT(2)	**Missing value operator:** <=
Field type (in algorithm): REAL(4)	**Factor:** 1
Dimensions: nbin,nray	**Offset:** 0
Units: mg m^{-3}	**MB:** 8.674

RO retrieved profile of LWC, obtained by performing a radar-only retrieval assuming the entire profile is liquid, zeroing out the portion of the profile with temperatures colder than Temp_min_mixph_K (presumed to be pure ice), and linearly scaling (with temperature) the portion of the profile with temperatures between Temp_min_mixph_K and Temp_max_mixph_K (presumed to be a mixture of ice and liquid).

Fill values:
0.0: Clear column (2B-GEOPROF)
-3333.0: Solution negative (2B-LWC-RO)
-4444.0: Solution diverged (2B-LWC-RO)
-7777.0: Unphysical, bad, or missing reflectivity factor Z' (2B-GEOPROF)
-8888.0: Cloud scenario not determined, invalid class, or class bad/missing (2B-CLDCLASS)
-9999.9: Bad or missing temperature (ECMWF-AUX)

(20) Radar-only Liquid Water Content Uncertainty

Name in file: RO_liq_water_content_uncertainty	**Range:** 0 to 250
Source: 2B-CWC-RO 008	**Missing value:** 253
Field type (in file): UINT(1)	**Missing value operator:** >=
Field type (in algorithm): REAL(4)	**Factor:** 1
Dimensions: nbin,nray	**Offset:** 0
Units: %	**MB:** 4.337

Fractional uncertainty in the RO retrieved LWC (from the liquid-only retrieval), expressed in percent and rounded to the nearest integer. A value of 250 indicates an uncertainty >= 250%.

Fill values:
0: Clear column (2B-GEOPROF)
253: Solution negative (2B-LWC-RO)
253: Solution diverged (2B-LWC-RO)
253: Unphysical, bad, or missing reflectivity factor Z' (2B-GEOPROF)

254: Cloud scenario not determined, invalid class, or class bad/missing (2B-CLDCLASS)
253: Bad or missing temperature (ECMWF-AUX)

(21) Radar-only Ice Water Content

Name in file: RO_ice_water_content
Source: 2B-CWC-RO 008
Field type (in file): INT(2)
Field type (in algorithm): REAL(4)
Dimensions: nbin,nray
Units: mg m^{-3}
Range: 0 to 10000
Missing value: -3333
Missing value operator: <=
Factor: 1
Offset: 0
MB: 8.674

RO retrieved profile of IWC, obtained by performing a radar-only retrieval assuming the entire profile is ice, zeroing out the portion of the profile with temperatures warmer than Temp_max_mixph_K (presumed to be pure liquid), and linearly scaling (with temperature) the portion of the profile with temperatures between Temp_min_mixph_K and Temp_max_mixph_K (presumed to be a mixture of ice and liquid).

Fill values:
0.0: Clear column (2B-GEOPROF)
-333.3: Solution negative (2B-IWC-RO)
-444.4: Solution diverged (2B-IWC-RO)
-777.7: Unphysical, bad, or missing reflectivity factor Z' (2B-GEOPROF)
-888.8: Cloud scenario not determined, invalid class, or class bad/missing (2B-CLDCLASS)
-999.9: Bad or missing temperature (ECMWF-AUX)

(22) Radar-only Ice Water Content Uncertainty

Name in file: RO_ice_water_content_uncertainty
Source: 2B-CWC-RO 008
Field type (in file): UINT(1)
Field type (in algorithm): REAL(4)
Dimensions: nbin,nray
Units: %
Range: 0 to 250
Missing value: 253
Missing value operator: >=
Factor: 1
Offset: 0
MB: 4.337

Fractional uncertainty in the RO retrieved IWC (from the ice-only retrieval), expressed in percent and rounded to the nearest integer. A value of 250 indicates an uncertainty >= 250%.

Fill values:
0: Clear column (2B-GEOPROF)
253: Solution negative (2B-IWC-RO)
253: Solution diverged (2B-IWC-RO)
253: Unphysical, bad, or missing reflectivity factor Z' (2B-GEOPROF)
254: Cloud scenario not determined, invalid class, or class bad/missing (2B-CLDCLASS)
253: Bad or missing temperature (ECMWF-AUX)

(23) Radar-only Ice Phase Fraction

Name in file: RO_ice_phase_fraction
Source: 2B-CWC-RO 008
Field type (in file): INT(2)
Field type (in algorithm): REAL(4)
Dimensions: nbin,nray
Units: --
Range: 0 to 1
Missing value: -3.333
Missing value operator: <=
Factor: 0.001
Offset: 0
MB: 8.674

Fraction of measured reflectivity assigned to the ice phase using a very simple temperature-based scheme (=1.0 below Temp_min_mixph_K, 0.0 above Temp_max_mixph_K, and varying linearly between these two temperatures). The effective number concentration in a given bin will be given by N_T * ro_ipf for ice and N_T * (1-ro_ipf) for liquid. The IWC and LWC are scaled in a similar manner.

(24) Combined Radar-only Status

Name in file: RO_CWC_status
Source: 2B-CWC-RO 008
Field type (in file): INT(2)
Field type (in algorithm): INT(2)
Dimensions: nray
Units: --
Range: -32768 to 32767
Missing value:
Missing value operator:
Factor: 1
Offset: 0
MB: 0.069

A two-byte (16-bit) status flag. Various bits indicate errors, convergence, and related information about the combined retrieval. Non-zero values of bits 0, 1, 4, 5, or 6 indicate a partially or wholly aborted retrieval.

0 (LSB): LWC retrieval failed
1: IWC retrieval failed
2: Possible precipitation (Z > -15 dBZe)
3: Combined LWC/IWC (both cloud types present in profile)
4: Bad GEOPROF input
5: Bad CLDCLASS input
6: Bad ECMWF temperature
7: Unassigned
8: Large chi^2 in LWC
9: Large chi^2 in IWC
10: Clear profile according to GEOPROF
11: Unassigned
12: Unassigned
13: Unassigned
14: Unassigned
15 (MSB): Unassigned

(25) Radar-only Liquid Water Path

Name in file: RO_liq_water_path
Source: 2B-CWC-RO 008
Field type (in file): INT(2)
Range: 0 to 15000
Missing value: -3333
Missing value operator: <=

Field type (in algorithm): REAL(4) **Factor:** 1
Dimensions: nray **Offset:** 0
Units: g m^{-2} **MB:** 0.069

RO retrieved value of LWP, obtained by performing a radar-only retrieval assuming the entire profile is liquid, and zeroing out cases where all cloudy bins are colder than Temp_min_mixph_K (presumed to be pure ice).

Fill values:
0.0: Clear column (2B-GEOPROF)
-3333.0: Solution negative (2B-LWC-RO)
-4444.0: Solution diverged (2B-LWC-RO)
-7777.0: Unphysical, bad, or missing reflectivity factor Z' (2B-GEOPROF)
-8888.0: Cloud scenario not determined, invalid class, or class bad/missing (2B-CLDCLASS)
-9999.0: Bad or missing temperature (ECMWF-AUX)

(26) Radar-only Ice Water Path

Name in file: RO_ice_water_path **Range:** 0 to 10000
Source: 2B-CWC-RO 008 **Missing value:** -3333
Field type (in file): INT(2) **Missing value operator:** <=
Field type (in algorithm): REAL(4) **Factor:** 1
Dimensions: nray **Offset:** 0
Units: g m^{-2} **MB:** 0.069

RO retrieved value of IWP, obtained by performing a radar-only retrieval assuming the entire profile is ice, and zeroing out cases where all cloudy bins are warmer than Temp_max_mixph_K (presumed to be pure liquid).

Fill values:
0.0: Clear column (2B-GEOPROF)
-333.3: Solution negative (2B-IWC-RO)
-444.4: Solution diverged (2B-IWC-RO)
-777.7: Unphysical, bad, or missing reflectivity factor Z' (2B-GEOPROF)
-888.8: Cloud scenario not determined, invalid class, or class bad/missing (2B-CLDCLASS)
-999.9: Bad or missing temperature (ECMWF-AUX)

(27) Cloud Fraction

Name in file: CloudFraction **Range:** 0 to 100
Source: 2B-GEOPROF-LIDAR 003 **Missing value:** -9
Field type (in file): INT(1) **Missing value operator:** ==
Field type (in algorithm): INT(1) **Factor:** 1
Dimensions: nbin,nray **Offset:** 0
Units: **MB:** 4.337

The CloudFraction reports the fraction of lidar volumes in a radar resolution volume that contains

hydrometeors. It is recorded per ray and per bin as a 1-byte integer variable. It is a percentage from 0 to 100.

(28) Number of hydrometeor layers

Name in file: CloudLayers
Source: 2B-GEOPROF-LIDAR 003
Field type (in file): INT(1)
Field type (in algorithm): INT(1)
Dimensions: nray
Units:
Range: 0 to 5
Missing value: -9
Missing value operator: ==
Factor: 1
Offset: 0
MB: 0.035

CloudLayers is a description of the number of the observed hydrometeor layers in the vertical column of the radar footprint. It is recoded per ray as 1-byte integer. Its value is from 0 to 5. A maximum of 5 layers are recorded.

(29) Height of Layer Base

Name in file: LayerBase
Source: 2B-GEOPROF-LIDAR 003
Field type (in file): INT(2)
Field type (in algorithm): REAL(4)
Dimensions: ncloud,nray
Units: m
Range: 0 to 25000
Missing value: -99
Missing value operator: ==
Factor: 1
Offset: 0
MB: 0.347

LayerBase is a description of the height of the observed hydrometeor layer base. It is recoded per ray as 4-byte float. Its value is from 0 to 25000. The units are meters.

(30) Height of layer top

Name in file: LayerTop
Source: 2B-GEOPROF-LIDAR 003
Field type (in file): INT(2)
Field type (in algorithm): REAL(4)
Dimensions: ncloud,nray
Units: m
Range: 0 to 25000
Missing value: -99
Missing value operator: ==
Factor: 1
Offset: 0
MB: 0.347

LayerTop is a description of the height of the observed hydrometeor layer top. It is recoded per ray as 4-byte float. Its value is from 0 to 25000. The units are meters.

(31) Optical Depth

Name in file: CS_Optical_Depth
Source: FLXHR-LIDAR-AUX 000
Field type (in file): REAL(4)
Field type (in algorithm): REAL(4)
Dimensions: nray
Range: 0 to 5
Missing value: -99999
Missing value operator:
Factor: 1
Offset: 0

Units: **MB:** 0.139

Optical depth of subvisible cirrus clouds ONLY. These are clouds detected by the Calipso and not CloudSat that are above the freezing level. Optical depths are found by using a Lidar transmission method from Lidar backscatter profiles. Values of -99999 are missing, and values of -999 are values where thin clouds exist but an optical depth could not be calculated.

(32) Number of Layers in Type 1

Name in file: High_Cloud_Layers **Range:** to
Source: FLXHR-LIDAR-AUX 000 **Missing value:** -99
Field type (in file): INT(2) **Missing value operator:**
Field type (in algorithm): INT(2) **Factor:** 1
Dimensions: nray **Offset:** 0
Units: **MB:** 0.069

If type 1 (subvisible cirrus) is found, this is how many veritical bins are in the cloud layer.

(33) Pixels in Layer

Name in file: CS_Pixels_In_Layer **Range:** to
Source: FLXHR-LIDAR-AUX 000 **Missing value:** -99
Field type (in file): INT(2) **Missing value operator:**
Field type (in algorithm): INT(2) **Factor:** 1
Dimensions: ncloud,nray **Offset:** 0
Units: **MB:** 0.347

How many vertical bins are in each cloud layer. Found by using information from Geoprof-Lidar and CS_Cloud_Class from this FLXHR-LIDAR-AUX product. Number of bins are taken from the layers boundaries CS_Res_Layer_Top and CS_Res_Layer_Bottom from this FLXHR-LIDAR-AUX product.

(34) Cloud Classification

Name in file: CS_Cloud_Class **Range:** 1 to 13
Source: FLXHR-LIDAR-AUX 000 **Missing value:** -99
Field type (in file): INT(2) **Missing value operator:**
Field type (in algorithm): INT(2) **Factor:** 1
Dimensions: nbin,nray **Offset:** 0
Units: **MB:** 8.674

Type of cloud in every CloudSat pixel. Classification can be seen below. Types are described by the amount the radar/lidar sees the cloud.

Type 1 base above 7 km lidar only
Type 2 above 7 km lidar and CS
Type 3 above 7 km CS only
Type 4 above 7 km lidar and CS, lidar sees >480m more above or below cloud L >7km
Type 5 above 7 km lidar sees more than half of cloud

Type 6 above 7 km lidar and CS, with more radar

Type 7 base below 7 km lidar only
Type 8 below 7 km lidar and CS
Type 9 below 7 km CS only
Type 10 below 7 km lidar and CS, lidar sees >480m more above or below cloud L <7km
Type 11 below 7 km lidar and CS, lidar sees >480m more above or below cloud L >7km
Type 12 below 7 km lidar sees more than half of cloud
Type 13 below 7 km lidar and CS, with more radar

(35) Layer Type

Name in file: CS_Layer_Type	**Range:** 1 to 13
Source: FLXHR-LIDAR-AUX 000	**Missing value:** -99
Field type (in file): INT(2)	**Missing value operator:**
Field type (in algorithm): INT(2)	**Factor:** 1
Dimensions: ncloud,nray	**Offset:** 0
Units:	**MB:** 0.347

Type of cloud in every layer. Classification can be seen below. Types are described by the amount the radar/lidar sees the cloud.

Type 1 base above 7 km lidar only
Type 2 above 7 km lidar and CS
Type 3 above 7 km CS only
Type 4 above 7 km lidar and CS, lidar sees >480m more above or below cloud L >7km
Type 5 above 7 km lidar sees more than half of cloud
Type 6 above 7 km lidar and CS, with more radar

Type 7 base below 7 km lidar only
Type 8 below 7 km lidar and CS
Type 9 below 7 km CS only
Type 10 below 7 km lidar and CS, lidar sees >480m more above or below cloud L <7km
Type 11 below 7 km lidar and CS, lidar sees >480m more above or below cloud L >7km
Type 12 below 7 km lidar sees more than half of cloud
Type 13 below 7 km lidar and CS, with more radar

(36) Calipso Optical Depth for thin cirrus

Name in file: CS_Calipso_Optical_Depth	**Range:** 0 to 5
Source: FLXHR-LIDAR-AUX 000	**Missing value:** -99999
Field type (in file): REAL(4)	**Missing value operator:**
Field type (in algorithm): REAL(4)	**Factor:** 1
Dimensions: nray	**Offset:** 0
Units:	**MB:** 0.139

Optical depth of subvisible cirrus clouds ONLY. These are clouds detected by the Calipso and not CloudSat that are above the freezing level. Optical depths are taken from Calipso's 5km Cloud Layer product.

(37) Calipso horizontal averaging

Name in file: Clay_Avg_Res
Source: FLXHR-LIDAR-AUX 000
Field type (in file): REAL(4)
Field type (in algorithm): REAL(4)
Dimensions: cal_cloud,nray
Units:
Range: to
Missing value:
Missing value operator:
Factor: 1
Offset: 0
MB: 1.388

Horizontal averaging required for cloud detection.
0=N/A
1=1/3km
2=1km
3=5km
4=20km
5=80km

(38) Aerosol Layer Base

Name in file: Alay_Base
Source: FLXHR-LIDAR-AUX 000
Field type (in file): REAL(4)
Field type (in algorithm): REAL(4)
Dimensions: naero,nray
Units: km
Range: to
Missing value: -9999
Missing value operator:
Factor: 1
Offset: 0
MB: 1.11

Base height of aerosol layers. Made from collocating CALIPSO Aerosol information to CloudSat

DIMENSIONS ARE ... (8,nray)

(39) Aerosol Layer Top

Name in file: Alay_Top
Source: FLXHR-LIDAR-AUX 000
Field type (in file): REAL(4)
Field type (in algorithm): REAL(4)
Dimensions: naero,nray
Units: km
Range: to
Missing value: -9999
Missing value operator:
Factor: 1
Offset: 0
MB: 1.11

Top height of aerosol layers. Made from collocating CALIPSO Aerosol information to CloudSat

DIMENSIONS ARE ... (8,nray)

(40) Aerosol Feature Classifiaction Flags

Name in file: Alay_Flag_Byte
Source: FLXHR-LIDAR-AUX 000
Field type (in file): UINT(2)
Range: to
Missing value:
Missing value operator:

Field type (in algorithm): UINT(4) **Factor:** 1
Dimensions: naero,nray **Offset:** 0
Units: **MB:** 0.555

Aerosol Feature Classification Flag***. Made from collocating CALIPSO information to CloudSat. Description of flags can be found in the CALIPSO Data Products Catalog in Table 45.

***For each layer, we report a set of feature classification flags that provide assessments of (a) feature type (e.g., cloud vs. aerosol vs. stratospheric layer); (b) feature subtype; (c) layer ice-water phase (clouds only); and (d) the amount of horizontal averaging required for layer detection. The complete set of flags is stored as a single 16-bit integer. A comprehensive description of the feature finder classification flags, including their derivation and physical significance, quality assessments, and guidelines for interpreting them in computer codes, can be found in the documentation for the vertical feature mask data product. (Taken from Calipso Quality Summary Statements)

(41) Aerosol Optical Depth 532 nm

Name in file: Alay_Tau_532 **Range:** to
Source: FLXHR-LIDAR-AUX 000 **Missing value:** -9999
Field type (in file): REAL(4) **Missing value operator:**
Field type (in algorithm): REAL(4) **Factor:** 1
Dimensions: naero,nray **Offset:** 0
Units: **MB:** 1.11

Base height of aerosol layers. Made from collocating CALIPSO Aerosol information to CloudSat

DIMENSIONS ARE ... (8,nray)

(42) Column cloud optical depth

Name in file: total_optical_depth **Range:** 0 to 50
Source: 2B-TAU 008 **Missing value:** -99
Field type (in file): INT(2) **Missing value operator:** ==
Field type (in algorithm): REAL(4) **Factor:** 0.01
Dimensions: nray **Offset:** 0
Units: - **MB:** 0.069

(43) mean cloud effective radius

Name in file: mean_effective_radius **Range:** 1 to 100
Source: 2B-TAU 008 **Missing value:** -99
Field type (in file): INT(2) **Missing value operator:** ==
Field type (in algorithm): REAL(4) **Factor:** 0.01
Dimensions: nray **Offset:** 0
Units: micron **MB:** 0.069

(44) Radar/VOD Ice Phase Fraction

Name in file: RVOD_ice_phase_fraction	**Range:** 0 to 1
Source: 2B-CWC-RVOD 008	**Missing value:** -3.333
Field type (in file): INT(2)	**Missing value operator:** <=
Field type (in algorithm): REAL(4)	**Factor:** 0.001
Dimensions: nbin,nray	**Offset:** 0
Units: --	**MB:** 8.674

Fraction of measured reflectivity assigned to the ice phase using a very simple temperature-based scheme (=1.0 below Temp_min_mixph_K, 0.0 above Temp_max_mixph_K, and varying linearly between these two temperatures). The effective number concentration in a given bin will be given by N_T * rvod_ipf for ice and N_T * (1-rvod_ipf) for liquid. The IWC and LWC are scaled in a similar manner.

(45) Combined Radar/VOD Status

Name in file: RVOD_CWC_status	**Range:** -32768 to 32767
Source: 2B-CWC-RVOD 008	**Missing value:**
Field type (in file): INT(2)	**Missing value operator:**
Field type (in algorithm): INT(2)	**Factor:** 1
Dimensions: nray	**Offset:** 0
Units: --	**MB:** 0.069

A two-byte (16-bit) status flag. Various bits indicate errors, convergence, and related information about the combined retrieval. Non-zero values of bits 0, 1, 4, 5, or 6 indicate a partially or wholly aborted retrieval.

0 (LSB): LWC retrieval failed
1: IWC retrieval failed
2: Possible precipitation (Z > -15 dBZe)
3: Combined LWC/IWC (both cloud types present in profile)
4: Bad GEOPROF input
5: Bad CLDCLASS input
6: Bad ECMWF temperature
7: Bad TAU input
8: Large chi^2 in LWC
9: Large chi^2 in IWC
10: Clear profile according to GEOPROF
11: Clear profile according to MODIS
12: Night side of orbit
13: Unassigned
14: Unassigned
15 (MSB): Unassigned

(46) Liquid-only Radar/VOD Effective Radius

Name in file: LO_RVOD_effective_radius
Source: 2B-CWC-RVOD 008
Field type (in file): INT(2)
Field type (in algorithm): REAL(4)
Dimensions: nbin,nray
Units: um
Range: 0 to 1000
Missing value: -333.3
Missing value operator: <=
Factor: 0.1
Offset: 0
MB: 8.674

RVOD retrieved profile of effective radius r_e. (This "LO" retrieval assumes the entire column is liquid-only.)

Fill values:
0.0: Clear column (2B-GEOPROF)
-333.3: Solution negative (2B-LWC-RVOD)
-444.4: Solution diverged (2B-LWC-RVOD)
-666.6: Optical depth zero, diverged, bad, or missing (2B-TAU)
-777.7: Unphysical, bad, or missing reflectivity factor Z' (2B-GEOPROF)
-888.8: Cloud scenario not determined, invalid class, or class bad/missing (2B-CLDCLASS)

(47) Liquid-only Radar/VOD Effective Radius Uncertainty

Name in file: LO_RVOD_effective_radius_uncertainty
Source: 2B-CWC-RVOD 008
Field type (in file): UINT(1)
Field type (in algorithm): REAL(4)
Dimensions: nbin,nray
Units: %
Range: 0 to 250
Missing value: 253
Missing value operator: >=
Factor: 1
Offset: 0
MB: 4.337

Fractional uncertainty in the RVOD retrieved r_e, expressed in percent and rounded to the nearest integer. (This "LO" retrieval assumes the entire column is liquid-only.) A value of 250 indicates an uncertainty >= 250%.

Fill values:
0: Clear column (2B-GEOPROF)
253: Solution negative (2B-LWC-RVOD)
253: Solution diverged (2B-LWC-RVOD)
252: Optical depth zero, diverged, bad, or missing (2B-TAU)
253: Unphysical, bad, or missing reflectivity factor Z' (2B-GEOPROF)
254: Cloud scenario not determined, invalid class, or class bad/missing (2B-CLDCLASS)

(48) Liquid-only Radar/VOD Liquid Water Content

Name in file: LO_RVOD_liquid_water_content
Source: 2B-CWC-RVOD 008
Field type (in file): INT(2)
Field type (in algorithm): REAL(4)
Dimensions: nbin,nray
Range: 0 to 15000
Missing value: -3333
Missing value operator: <=
Factor: 1
Offset: 0

Units: mg m^{-3} **MB:** 8.674

RVOD retrieved profile of LWC. (This "LO" retrieval assumes the entire column is liquid-only.)

Fill values:
0: Clear column (2B-GEOPROF)
-3333.0: Solution negative (2B-LWC-RVOD)
-4444.0: Solution diverged (2B-LWC-RVOD)
-6666.0: Optical depth zero, diverged, bad, or missing (2B-TAU)
-7777.0: Unphysical, bad, or missing reflectivity factor Z' (2B-GEOPROF)
-8888.0: Cloud scenario not determined, invalid class, or class bad/missing (2B-CLDCLASS)

(49) Liquid-only Radar/VOD Liquid Water Content Uncertainty

Name in file: LO_RVOD_liquid_water_content_uncertainty **Range:** 0 to 250
Source: 2B-CWC-RVOD 008 **Missing value:** 253
Field type (in file): UINT(1) **Missing value operator:** >=
Field type (in algorithm): REAL(4) **Factor:** 1
Dimensions: nbin,nray **Offset:** 0
Units: % **MB:** 4.337

Fractional uncertainty in the RVOD retrieved LWC, expressed in percent and rounded to the nearest integer. (This "LO" retrieval assumes the entire column is liquid-only.) A value of 250 indicates an uncertainty >= 250%.

Fill values:
0: Clear column (2B-GEOPROF)
253: Solution negative (2B-LWC-RVOD)
253: Solution diverged (2B-LWC-RVOD)
252: Optical depth zero, diverged, bad, or missing (2B-TAU)
253: Unphysical, bad, or missing reflectivity factor Z' (2B-GEOPROF)
254: Cloud scenario not determined, invalid class, or class bad/missing (2B-CLDCLASS)

(50) Liquid-only Radar/VOD Liquid Water Path

Name in file: LO_RVOD_liquid_water_path **Range:** 0 to 15000
Source: 2B-CWC-RVOD 008 **Missing value:** -3333
Field type (in file): INT(2) **Missing value operator:** <=
Field type (in algorithm): REAL(4) **Factor:** 1
Dimensions: nray **Offset:** 0
Units: g m^{-2} **MB:** 0.069

RVOD retrieved value of LWP. (This "LO" retrieval assumes the entire column is liquid-only.)

Fill values:

0: Clear column (2B-GEOPROF)
-3333.0: Solution negative (2B-LWC-RVOD)
-4444.0: Solution diverged (2B-LWC-RVOD)
-6666.0: Optical depth zero, diverged, bad, or missing (2B-TAU)
-7777.0: Unphysical, bad, or missing reflectivity factor Z' (2B-GEOPROF)
-8888.0: Cloud scenario not determined, invalid class, or class bad/missing (2B-CLDCLASS)

(51) Ice-only Radar/VOD Effective Radius

Name in file: IO_RVOD_effective_radius	**Range:** 0 to 300
Source: 2B-CWC-RVOD 008	**Missing value:** -333.3
Field type (in file): INT(2)	**Missing value operator:** <=
Field type (in algorithm): REAL(4)	**Factor:** 0.1
Dimensions: nbin,nray	**Offset:** 0
Units: um	**MB:** 8.674

RVOD retrieved profile of effective radius r_e. (This "IO" retrieval assumes the entire column is ice-only.)

Fill values:
0.0: Clear column (2B-GEOPROF)
-333.3: Solution negative (2B-IWC-RVOD)
-444.4: Solution diverged (2B-IWC-RVOD)
-666.6: Optical depth zero, diverged, bad, or missing (2B-TAU)
-777.7: Unphysical, bad, or missing reflectivity factor Z' (2B-GEOPROF)
-888.8: Cloud scenario not determined, invalid class, or class bad/missing (2B-CLDCLASS)

(52) Ice-only Radar/VOD Effective Radius Uncertainty

Name in file: IO_RVOD_effective_radius_uncertainty	**Range:** 0 to 250
Source: 2B-CWC-RVOD 008	**Missing value:** 252
Field type (in file): UINT(1)	**Missing value operator:** >=
Field type (in algorithm): REAL(4)	**Factor:** 1
Dimensions: nbin,nray	**Offset:** 0
Units: %	**MB:** 4.337

Fractional uncertainty in the RVOD retrieved r_e, expressed in percent and rounded to the nearest integer. (This "IO" retrieval assumes the entire column is ice-only.) A value of 250 indicates an uncertainty >= 250%.

Fill values:
0: Clear column (2B-GEOPROF)
253: Solution negative (2B-IWC-RVOD)
253: Solution diverged (2B-IWC-RVOD)
252: Optical depth zero, diverged, bad, or missing (2B-TAU)
253: Unphysical, bad, or missing reflectivity factor Z' (2B-GEOPROF)
254: Cloud scenario not determined, invalid class, or class bad/missing (2B-CLDCLASS)

(53) Ice-only Radar/VOD Ice Water Content

Name in file: IO_RVOD_ice_water_content
Range: 0 to 10000
Source: 2B-CWC-RVOD 008
Missing value: -3333
Field type (in file): INT(2)
Missing value operator: <=
Field type (in algorithm): REAL(4)
Factor: 1
Dimensions: nbin,nray
Offset: 0
Units: mg m^{-3}
MB: 8.674

RVOD retrieved profile of IWC. (This "IO" retrieval assumes the entire column is ice-only.)

Fill values:
0: Clear column (2B-GEOPROF)
-3333: Solution negative (2B-IWC-RVOD)
-4444: Solution diverged (2B-IWC-RVOD)
-6666: Optical depth zero, diverged, bad, or missing (2B-TAU)
-7777: Unphysical, bad, or missing reflectivity factor Z' (2B-GEOPROF)
-8888: Cloud scenario not determined, invalid class, or class bad/missing (2B-CLDCLASS)

(54) Ice-only Radar/VOD Ice Water Content Uncertainty

Name in file: IO_RVOD_ice_water_content_uncertainty
Range: 0 to 250
Source: 2B-CWC-RVOD 008
Missing value: 252
Field type (in file): UINT(1)
Missing value operator: >=
Field type (in algorithm): REAL(4)
Factor: 1
Dimensions: nbin,nray
Offset: 0
Units: %
MB: 4.337

Fractional uncertainty in the RVOD retrieved IWC, expressed in percent and rounded to the nearest integer. (This "IO" retrieval assumes the entire column is ice-only.) A value of 250 indicates an uncertainty >= 250%.

Fill values:
0: Clear column (2B-GEOPROF)
253: Solution negative (2B-IWC-RVOD)
253: Solution diverged (2B-IWC-RVOD)
252: Optical depth zero, diverged, bad, or missing (2B-TAU)
253: Unphysical, bad, or missing reflectivity factor Z' (2B-GEOPROF)
254: Cloud scenario not determined, invalid class, or class bad/missing (2B-CLDCLASS)

(55) Ice-only Radar/VOD Ice Water Path

Name in file: IO_RVOD_ice_water_path
Range: 0 to 10000
Source: 2B-CWC-RVOD 008
Missing value: -3333
Field type (in file): INT(2)
Missing value operator: <=
Field type (in algorithm): REAL(4)
Factor: 1
Dimensions: nray
Offset: 0
Units: g m^{-2}
MB: 0.069

RVOD retrieved value of IWP. (This "IO" retrieval assumes the entire column is ice-only.)

Fill values:
0: Clear column (2B-GEOPROF)
-3333: Solution negative (2B-IWC-RVOD)
-4444: Solution diverged (2B-IWC-RVOD)
-6666: Optical depth zero, diverged, bad, or missing (2B-TAU)
-7777: Unphysical, bad, or missing reflectivity factor Z' (2B-GEOPROF)
-8888: Cloud scenario not determined, invalid class, or class bad/missing (2B-CLDCLASS)

(56) Surface Type

Name in file: Surface Type
Source: AMSR-AUX 000
Field type (in file): INT(1)
Field type (in algorithm): INT(1)
Dimensions: nray
Units:
Range: 0 to 3
Missing value: -99
Missing value operator: ==
Factor: 1
Offset: 0
MB: 0.035

0: Ocean
1: Land
2: Coast
3: Sea Ice

(57) Rain_top_height

Name in file: Rain_top_height
Source: 2C-PRECIP-COLUMN 001
Field type (in file): REAL(4)
Field type (in algorithm): REAL(4)
Dimensions: nray
Units: km
Range: 0 to 18
Missing value: -1000
Missing value operator: ==
Factor: 1
Offset: 0
MB: 0.139

Estimated maximum height at which liquid precipitation is found in the column (km).

(58) Freezing_level

Name in file: Freezing_level
Source: 2C-PRECIP-COLUMN 001
Field type (in file): REAL(4)
Field type (in algorithm): REAL(4)
Dimensions: nray
Units: km
Range: 0 to 10
Missing value: -1000
Missing value operator: ==
Factor: 1
Offset: 0
MB: 0.139

The height of the freezing level; from ECMWF (km). -8 corresponds to below surface.

(59) Precip_flag

Name in file: Precip_flag
Source: 2C-PRECIP-COLUMN 001
Range: 0 to 9
Missing value:

Field type (in file): INT(1)
Field type (in algorithm): INT(1)
Dimensions: nray
Units:
Missing value operator:
Factor: 1
Offset: 0
MB: 0.035

0 - no precip detected
Flags for rain:
  1 - possible
  2 - probable
  3 - certain
Flags for snow:
  4 - possible
  5 - certain
Flags for mixed:
  6 - possible
  7 - certain
9 - uncertain, see Status_flag

(60) Rain Liquid Water Path

Name in file: RLWP
Source: 2C-PRECIP-COLUMN 001
Field type (in file): REAL(4)
Field type (in algorithm): REAL(8)
Dimensions: nray
Units: g m^{-2}
Range: 0 to 50000
Missing value: -1000
Missing value operator: ==
Factor: 1
Offset: 0
MB: 0.139

Column-integrated liquid water content of precipitating hydrometeors.

(61) Cloud Liquid Water Path

Name in file: CLWP
Source: 2C-PRECIP-COLUMN 001
Field type (in file): REAL(4)
Field type (in algorithm): REAL(8)
Dimensions: nray
Units: g m^{-2}
Range: 0 to 50000
Missing value: -1000
Missing value operator: ==
Factor: 1
Offset: 0
MB: 0.139

Column-integrated water content of non-precipitating liquid hydrometeors.

(62) Diagnostic_retrieval_info

Name in file: Diagnostic_retrieval_info
Source: 2C-PRECIP-COLUMN 001
Field type (in file): INT(1)
Field type (in algorithm): INT(1)
Dimensions: nray
Range: 0 to 51
Missing value:
Missing value operator:
Factor: 1
Offset: 0

Units: **MB:** 0.035

0 - no additional information to report
9 - uncertain, see Status_flag

Reasons no quantitative precip retrieval was performed:
1 - melted fraction of surface precipitation too small (< 85%)
2 - only snow was present
8 - land, sea ice, or unknown surface

Additional information:
3 - PIA was less than the lowest table value; revert to Z-R relation
50 - precipitation rate ceiling was encountered
51 - multiple solutions were found

3. Product Field Specifications

3.1 2B-FLXHR-LIDAR 008 Fields

(1) Seconds since the start of the granule.

Name in file: Profile_time **Range:** 0 to 6000
Source: 2B-GEOPROF 011 **Missing value:**
Field type (in file): REAL(4) **Missing value operator:**
Field type (in algorithm): REAL(4) **Factor:** 1
Dimensions: nray **Offset:** 0
Units: seconds **MB:** 0.139

Seconds since the start of the granule for each profile. The first profile is 0.

(2) UTC seconds since 00:00 Z of the first profile

Name in file: UTC_start **Range:** 0 to 86400
Source: 2B-GEOPROF 011 **Missing value:**
Field type (in file): REAL(4) **Missing value operator:**
Field type (in algorithm): REAL(4) **Factor:** 1
Dimensions: <scalar> **Offset:** 0
Units: seconds **MB:** 0

The UTC seconds since 00:00 Z of the first profile in the data file.

(3) TAI time for the first profile.

Name in file: TAI_start **Range:** 0 to 6e+008

Source: 2B-GEOPROF 011
Field type (in file): REAL(8)
Field type (in algorithm): REAL(8)
Dimensions: <scalar>
Units: seconds
Missing value:
Missing value operator:
Factor: 1
Offset: 0
MB: 0

The TAI timestamp for the first profile in the data file. TAI is International Atomic Time: seconds since 00:00:00 Jan 1 1993.

(4) Spacecraft Latitude

Name in file: Latitude
Source: 2B-GEOPROF 011
Field type (in file): REAL(4)
Field type (in algorithm): REAL(4)
Dimensions: nray
Units: degrees
Range: -90 to 90
Missing value:
Missing value operator:
Factor: 1
Offset: 0
MB: 0.139

Spacecraft Geodetic Latitude.

(5) Spacecraft Longitude

Name in file: Longitude
Source: 2B-GEOPROF 011
Field type (in file): REAL(4)
Field type (in algorithm): REAL(4)
Dimensions: nray
Units: degrees
Range: -180 to 180
Missing value:
Missing value operator:
Factor: 1
Offset: 0
MB: 0.139

Spacecraft geodetic longitude

(6) Height of range bin in Reflectivity/Cloud Mask above reference surface (~ mean sea level).

Name in file: Height
Source: 2B-GEOPROF 011
Field type (in file): INT(2)
Field type (in algorithm): INT(2)
Dimensions: nbin,nray
Units: m
Range: -5000 to 30000
Missing value: -9999
Missing value operator: ==
Factor: 1
Offset: 0
MB: 8.674

Height of the radar range bins in meters above mean sea level.

(7) Range to the CPR boresight intercept with the geoid

Name in file: Range_to_intercept
Source: 2B-GEOPROF 011
Range: 600 to 800
Missing value:

Field type (in file): REAL(4) **Missing value operator:**
Field type (in algorithm): REAL(4) **Factor:** 1
Dimensions: nray **Offset:** 0
Units: km **MB:** 0.139

Range from the spacecraft to the CPR boresight intercept with the geoid.

(8) Digital Elevation Map

Name in file: DEM_elevation **Range:** -9999 to 8850
Source: 2B-GEOPROF 011 **Missing value:** 9999
Field type (in file): INT(2) **Missing value operator:** ==
Field type (in algorithm): INT(2) **Factor:** 1
Dimensions: nray **Offset:** 0
Units: meters **MB:** 0.069

Elevation in meters above Mean Sea Level. A value of -9999 indicates ocean. A value of 9999 indicates an error in calculation of the elevation.

(9)

Name in file: Vertical_binsize **Range:** to
Source: 2B-GEOPROF 011 **Missing value:** -9999
Field type (in file): REAL(4) **Missing value operator:** ==
Field type (in algorithm): REAL(4) **Factor:** 1
Dimensions: <scalar> **Offset:** 0
Units: m **MB:** 0

effective vertical height of the radar range bin.

(10) Nominal satellite pitch angle offset from nadir

Name in file: Pitch_offset **Range:** -90 to 90
Source: 2B-GEOPROF 011 **Missing value:**
Field type (in file): REAL(4) **Missing value operator:**
Field type (in algorithm): REAL(4) **Factor:** 1
Dimensions: <scalar> **Offset:** 0
Units: degrees **MB:** 0

The pitch angle offset from nadir during normal operations. Pitch up is positive (radar points along the flight track in the direction of motion), down is negative (radar points along the flight track opposite the direction of motion).

(11) Nominal satellite roll angle offset from nadir

Name in file: Roll_offset **Range:** -90 to 90
Source: 2B-GEOPROF 011 **Missing value:**

Field type (in file): REAL(4)	**Missing value operator:**
Field type (in algorithm): REAL(4)	**Factor:** 1
Dimensions: <scalar>	**Offset:** 0
Units: degrees	**MB:** 0

The roll angle offset from nadir during normal operations. Positive roll results in the radar pointing to the right of the flight track. Negative roll to the left.

(12) Data Quality

Name in file: Data_quality	**Range:** 0 to 127
Source: 2B-GEOPROF 011	**Missing value:**
Field type (in file): UINT(1)	**Missing value operator:**
Field type (in algorithm): INT(2)	**Factor:** 1
Dimensions: nray	**Offset:** 0
Units: --	**MB:** 0.035

Flags indicating data quality. If 0, then data is of good quality. Otherwise, treat as a bit field with 8 flags:

0: RayStatus_validity not normal.
1: GPS data not valid.
2: Temperatures not valid.
3: Radar telemetry data quality is not normal.
4: Peak power is not normal.
5: CPR calibration maneuver.
6: Missing frame.
7: Not used.

(13) Data status flags

Name in file: Data_status	**Range:** 0 to 127
Source: 2B-GEOPROF 011	**Missing value:**
Field type (in file): UINT(1)	**Missing value operator:**
Field type (in algorithm): UINT(1)	**Factor:** 1
Dimensions: nray	**Offset:** 0
Units: --	**MB:** 0.035

This is a bit field that contains data status flags:

Bit 0: missing frame (0=false, 1=true)
Bit 1: SOH missing (0=false, 1=true)
Bit 2: GPS data valid (0=false, 1=true)
Bit 3: 1 PPS lost (0=false, 1=true)
Bit 4: Star tracker 1 (0=off, 1=on)
Bit 5: Star tracker 2 (0=off, 1=on)
Bit 6: Coast (0=false, 1=true)
Bit 7: NISC (0=false, 1=true)

(14) CPR bus orientation (target ID)

Name in file: Data_targetID	**Range:** 0 to 81
Source: 2B-GEOPROF 011	**Missing value:**
Field type (in file): UINT(1)	**Missing value operator:**
Field type (in algorithm): INT(1)	**Factor:** 1
Dimensions: nray	**Offset:** 0
Units: --	**MB:** 0.035

The target id indicates the orientation of the spacecraft bus. For normal operations the target ID is 0. The complete ID table is listed below:

Control Frame 0
0: CPR to point in 300 seconds - Nominal science mode
1 - 15: Target ID for testing - not planned for operational use

Control Frame 0, CPR Calibration
16: CPR to point in 160 seconds
17: CPR 15º to the right
18: CPR 15º to the left
19: CPR 10º to the right -- default rotation
20: CPR 10º to the left -- default rotation
21: CPR 5º to the right
22: CPR 5º to the left
23 - 29: Target ID for testing - not planned for operational use
30 - 36: CPR rotation - not planned for operational use
37 - 39: Not planned for operational use

Control Frame 1, Four thruster closed-loop
40: Rotation into the OR orientation
41: Rotation into the x-track along the anti-ang momentum
42: Rotation into the x-track along ang momentum
43: Rotation into the orbit lower orientation
44: Rotation into alt. OR w/ CPR away from Sun
45 - 49: Not planned for operational use

Control Frame 2, One thruster open-loop
50: Rotation into the OR orientation
51: Rotation into the x-track along the anti-ang momentum
52: Rotation into the x-track along ang momentum
53: Rotation into the orbit lower orientation
54: Rotation into alt. OR w/ CPR away from Sun
55 - 59: Not planned for operational use

Control Frame 3, Two thruster open-loop
60: Rotation into the OR orientation
61: Rotation into the x-track along the anti-ang momentum
62: Rotation into the x-track along ang momentum
63: Rotation into the orbit lower orientation
64: Rotation into alt. OR w/ CPR away from Sun

65 - 69: Not planned for operational use

Control Frame 4, Four thruster open-loop
70: Rotation into the OR orientation
71: Rotation into the x-track along the anti-ang momentum
72: Rotation into the x-track along ang momentum
73: Rotation into the orbit lower orientation
74: Rotation into alt. OR w/ CPR away from Sun
75 - 80: Not planned for operational use

Control Frame 5
81: Body into the x-track along the anti-ang momentum
82 - 1023: Not planned for operational use

(15) Downwelling fluxes

Name in file: FD
Source: 2B-FLXHR-LIDAR 008
Field type (in file): INT(2)
Field type (in algorithm): REAL(8)
Dimensions: nz_flux_flxhr2b,nray,nbands_flxhr2b
Units: W/m^2
Range: 0 to 1500
Missing value: -999
Missing value operator: ==
Factor: 0.1
Offset: 0
MB: 17.349

Downwelling long- and shortwave fluxes for each pixel.

(16) Downwelling clear sky flux profiles

Name in file: FD_NC
Source: 2B-FLXHR-LIDAR 008
Field type (in file): INT(2)
Field type (in algorithm): REAL(8)
Dimensions: nz_flux_flxhr2b,nray,nbands_flxhr2b
Units: W/m2
Range: 0 to 1500
Missing value: -999
Missing value operator: ==
Factor: 0.1
Offset: 0
MB: 17.349

Downwelling long- and shortwave fluxes in the absence of clouds

(17) Downwelling Fluxes without aerosol

Name in file: FD_NA
Source: 2B-FLXHR-LIDAR 008
Field type (in file): INT(2)
Field type (in algorithm): REAL(8)
Dimensions: nz_flux_flxhr2b,nray,nbands_flxhr2b
Units: W/m^2
Range: 0 to 1500
Missing value: -999
Missing value operator: ==
Factor: 0.1
Offset: 0
MB: 17.349

Upwelling long- and shortwave fluxes for each pixel without aerosol.

(18) Upwelling fluxes

Name in file: FU
Source: 2B-FLXHR-LIDAR 008
Field type (in file): INT(2)
Field type (in algorithm): REAL(8)
Dimensions: nz_flux_flxhr2b,nray,nbands_flxhr2b
Units: W/m^2
Range: 0 to 1500
Missing value: -999
Missing value operator: ==
Factor: 0.1
Offset: 0
MB: 17.349

Upwelling long- and shortwave fluxes for each pixel.

(19) Upwelling clear sky flux profiles

Name in file: FU_NC
Source: 2B-FLXHR-LIDAR 008
Field type (in file): INT(2)
Field type (in algorithm): REAL(8)
Dimensions: nz_flux_flxhr2b,nray,nbands_flxhr2b
Units: W/m2
Range: 0 to 1500
Missing value: -999
Missing value operator: ==
Factor: 0.1
Offset: 0
MB: 17.349

Upwelling long- and shortwave fluxes in the absence of clouds

(20) Upwelling Fluxes with no Aerosol

Name in file: FU_NA
Source: 2B-FLXHR-LIDAR 008
Field type (in file): INT(2)
Field type (in algorithm): REAL(8)
Dimensions: nz_flux_flxhr2b,nray,nbands_flxhr2b
Units: W/m^2
Range: 0 to 1500
Missing value: -999
Missing value operator: ==
Factor: 0.1
Offset: 0
MB: 17.349

Upwelling long- and shortwave fluxes for each pixel without aerosol.

(21) Heating rates

Name in file: QR
Source: 2B-FLXHR-LIDAR 008
Field type (in file): INT(2)
Field type (in algorithm): REAL(8)
Dimensions: nz_hr_flxhr2b,nray,nbands_flxhr2b
Units: K/day
Range: -200 to 200
Missing value: -999
Missing value operator: ==
Factor: 0.01
Offset: 0
MB: 17.21

Longwave and shortwave radiative heating rates.

(22) Column-integrated radiative heating

Name in file: RH
Source: 2B-FLXHR-LIDAR 008
Field type (in file): INT(2)
Range: -10 to 10
Missing value: -999
Missing value operator: ==

Field type (in algorithm): REAL(8) **Factor:** 0.01
Dimensions: nray,nbands_flxhr2b **Offset:** 0
Units: K/day **MB:** 0.139

Long- and shortwave atmospheric radiative heating integrated over the entire column

(23) TOA cloud radiative effect

Name in file: TOACRE **Range:** 0 to 1500
Source: 2B-FLXHR-LIDAR 008 **Missing value:** -999
Field type (in file): INT(2) **Missing value operator:** ==
Field type (in algorithm): REAL(8) **Factor:** 1
Dimensions: nray,nbands_flxhr2b **Offset:** 0
Units: W/m2 **MB:** 0.139

Cloud impact on long- and shortwave fluxes at the top of the atmosphere

(24) BOA cloud radiative effect

Name in file: BOACRE **Range:** 0 to 1500
Source: 2B-FLXHR-LIDAR 008 **Missing value:** -999
Field type (in file): INT(2) **Missing value operator:** ==
Field type (in algorithm): REAL(8) **Factor:** 1
Dimensions: nray,nbands_flxhr2b **Offset:** 0
Units: W/m2 **MB:** 0.139

Cloud impact on long- and shortwave fluxes at the bottom of the atmosphere (i.e. the surface)

(25) RVOD Status flag

Name in file: Scene_status **Range:** 1 to 6
Source: 2B-FLXHR-LIDAR 008 **Missing value:**
Field type (in file): INT(2) **Missing value operator:**
Field type (in algorithm): INT(2) **Factor:** 1
Dimensions: nray **Offset:** 0
Units: **MB:** 0.069

The scene status flag is a 16-bit flag with values indicating whether or not the external products are used in any given pixel. The flag will indicate whether the pixel was observed during the day or at night, cloud and aerosol detected by CALIPSO are flagged,
along with information on the use of AMSR-E and precipitation from 2C-PRECIP-COLUMN. For 2B-FLXHR there
are components of the status flag that will always be turned on, such as: Missing 2B-Tau, missing CALIOP.

(26) Lidar status flag

Name in file: lidar_status **Range:** 1 to 4

Source: 2B-FLXHR-LIDAR 008
Field type (in file): INT(2)
Field type (in algorithm): INT(2)
Dimensions: nray
Units:
Missing value:
Missing value operator:
Factor: 1
Offset: 0
MB: 0.069

Determines whether or not lidar data was used for each ray. Values of 1 and 2 correspond to cases where extra cloud is defined based on GEOPROF-lidar in day and night scenes, respectively. Values of 3 and 4 indicate no additional clouds were found.

(27) Flux and heating rate quality status

Name in file: Status
Source: 2B-FLXHR-LIDAR 008
Field type (in file): INT(2)
Field type (in algorithm): INT(2)
Dimensions: nray
Units: --
Range: 1 to 20
Missing value:
Missing value operator:
Factor: 1
Offset: 0
MB: 0.069

This field summarizes the status of each pixel identifying those with bad input or output data and identifying daytime and nighttime pixels.

(28) Bin counter

Name in file: BinCounts
Source: 2B-FLXHR-LIDAR 008
Field type (in file): INT(2)
Field type (in algorithm): INT(4)
Dimensions: nlatbins,nflags
Units:
Range: 0 to 36383
Missing value:
Missing value operator:
Factor: 1
Offset: 0
MB: 0

Number of CloudSat pixels falling into each latitude-status flag bin.

(29) Mean solar insolation at TOA

Name in file: Meansolar
Source: 2B-FLXHR-LIDAR 008
Field type (in file): INT(2)
Field type (in algorithm): REAL(8)
Dimensions: nlatbins,nflags
Units: W/m^2
Range: 0 to 1367
Missing value:
Missing value operator:
Factor: 1
Offset: 0
MB: 0

Mean downwelling shortwave flux at the top of the atmosphere in each latitude/status flag bin.

(30) Standard deviation of solar insolation

Name in file: Sigmasolar
Range: 0 to 1367

Source: 2B-FLXHR-LIDAR 008
Field type (in file): INT(2)
Field type (in algorithm): REAL(8)
Dimensions: nlatbins,nflags
Units: W/m^2
Missing value:
Missing value operator:
Factor: 1
Offset: 0
MB: 0

Standard deviation of downwelling shortwave flux at the top of the atmosphere over each latitude/status flag bin.

(31) Mean outgoing shortwave radiation

Name in file: MeanOSR
Source: 2B-FLXHR-LIDAR 008
Field type (in file): INT(2)
Field type (in algorithm): REAL(8)
Dimensions: nlatbins,nflags
Units: W/m^2
Range: 0 to 1367
Missing value:
Missing value operator:
Factor: 1
Offset: 0
MB: 0

Mean upwelling shortwave flux at the top of the atmosphere in each latitude/status flag bin.

(32) Standard deviation of outgoing shortwave radiation

Name in file: SigmaOSR
Source: 2B-FLXHR-LIDAR 008
Field type (in file): INT(2)
Field type (in algorithm): REAL(8)
Dimensions: nlatbins,nflags
Units: W/m^2
Range: 0 to 1367
Missing value:
Missing value operator:
Factor: 1
Offset: 0
MB: 0

Standard deviation of upwelling shortwave flux at the top of the atmosphere over each latitude/status flag bin.

(33) Mean surface shortwave radiation

Name in file: MeanSSR
Source: 2B-FLXHR-LIDAR 008
Field type (in file): INT(2)
Field type (in algorithm): REAL(8)
Dimensions: nlatbins,nflags
Units: W/m^2
Range: 0 to 1367
Missing value:
Missing value operator:
Factor: 1
Offset: 0
MB: 0

Mean downwelling shortwave flux at the surface in each latitude/status flag bin.

(34) Standard deviation of surface shortwave radiation

Name in file: SigmaSSR
Source: 2B-FLXHR-LIDAR 008
Range: 0 to 1367
Missing value:

Field type (in file): INT(2) **Missing value operator:**
Field type (in algorithm): REAL(8) **Factor:** 1
Dimensions: nlatbins,nflags **Offset:** 0
Units: W/m^2 **MB:** 0

Standard deviation of downwelling shortwave flux at the surface over each latitude/status flag bin.

(35) Mean reflected shortwave radiation at surface

Name in file: MeanSFCR **Range:** 0 to 1367
Source: 2B-FLXHR-LIDAR 008 **Missing value:**
Field type (in file): INT(2) **Missing value operator:**
Field type (in algorithm): REAL(8) **Factor:** 1
Dimensions: nlatbins,nflags **Offset:** 0
Units: W/m^2 **MB:** 0

Mean upwelling shortwave flux at the surface in each latitude/status flag bin.

(36) Standard deviation of reflected shortwave radiation at surface

Name in file: SigmaSFCR **Range:** 0 to 1367
Source: 2B-FLXHR-LIDAR 008 **Missing value:**
Field type (in file): INT(2) **Missing value operator:**
Field type (in algorithm): REAL(8) **Factor:** 1
Dimensions: nlatbins,nflags **Offset:** 0
Units: W/m^2 **MB:** 0

Standard deviation of upwelling shortwave flux at the surface over each latitude/status flag bin.

(37) Mean outgoing longwave radiation

Name in file: MeanOLR **Range:** 0 to 1367
Source: 2B-FLXHR-LIDAR 008 **Missing value:**
Field type (in file): INT(2) **Missing value operator:**
Field type (in algorithm): REAL(8) **Factor:** 1
Dimensions: nlatbins,nflags **Offset:** 0
Units: W/m^2 **MB:** 0

Mean upwelling longwave flux at the top of the atmosphere in each latitude/status flag bin.

(38) Standard deviation of outgoing longwave radiation

Name in file: SigmaOLR **Range:** 0 to 1367
Source: 2B-FLXHR-LIDAR 008 **Missing value:**
Field type (in file): INT(2) **Missing value operator:**
Field type (in algorithm): REAL(8) **Factor:** 1
Dimensions: nlatbins,nflags **Offset:** 0

Units: W/m^2 **MB:** 0

Standard deviation of upwelling longwave flux at the top of the atmosphere over each latitude/status flag bin.

(39) Mean surface longwave radiation

Name in file: MeanSLR **Range:** 0 to 1367
Source: 2B-FLXHR-LIDAR 008 **Missing value:**
Field type (in file): INT(2) **Missing value operator:**
Field type (in algorithm): REAL(8) **Factor:** 1
Dimensions: nlatbins,nflags **Offset:** 0
Units: W/m^2 **MB:** 0

Mean downwelling longwave flux at the surface in each latitude/status flag bin.

(40) Standard deviation of surface longwave radiation

Name in file: SigmaSLR **Range:** 0 to 1367
Source: 2B-FLXHR-LIDAR 008 **Missing value:**
Field type (in file): INT(2) **Missing value operator:**
Field type (in algorithm): REAL(8) **Factor:** 1
Dimensions: nlatbins,nflags **Offset:** 0
Units: W/m^2 **MB:** 0

Standard deviation of downwelling longwave flux at the surface over each latitude/status flag bin.

(41) Mean emitted longwave radiation at surface

Name in file: MeanSFCE **Range:** 0 to 1367
Source: 2B-FLXHR-LIDAR 008 **Missing value:**
Field type (in file): INT(2) **Missing value operator:**
Field type (in algorithm): REAL(8) **Factor:** 1
Dimensions: nlatbins,nflags **Offset:** 0
Units: W/m^2 **MB:** 0

Mean upwelling longwave flux at the surface in each latitude/status flag bin.

(42) Standard deviation of emitted longwave radiation at surface

Name in file: SigmaSFCE **Range:** 0 to 1367
Source: 2B-FLXHR-LIDAR 008 **Missing value:**
Field type (in file): INT(2) **Missing value operator:**
Field type (in algorithm): REAL(8) **Factor:** 1
Dimensions: nlatbins,nflags **Offset:** 0
Units: W/m^2 **MB:** 0

Standard deviation of upwelling longwave flux at the surface over each latitude/status flag bin.

(43) Mean integrated atmospheric longwave heating

Name in file: MeanQLW
Source: 2B-FLXHR-LIDAR 008
Field type (in file): INT(2)
Field type (in algorithm): REAL(8)
Dimensions: nlatbins,nflags
Units: K/day
Range: -10 to 10
Missing value: -999
Missing value operator: ==
Factor: 0.01
Offset: 0
MB: 0

Mean longwave total atmospheric radiative heating rate for each latitude/status flag bin.

(44) Standard deviation of atmospheric longwave heating

Name in file: SigmaQLW
Source: 2B-FLXHR-LIDAR 008
Field type (in file): INT(2)
Field type (in algorithm): REAL(8)
Dimensions: nlatbins,nflags
Units: K/day
Range: -10 to 10
Missing value: -999
Missing value operator: ==
Factor: 0.01
Offset: 0
MB: 0

Standard deviation of total atmospheric longwave radiative heating rate over each latitude/status flag bin.

(45) Mean integrated atmospheric shortwave heating

Name in file: MeanQSW
Source: 2B-FLXHR-LIDAR 008
Field type (in file): INT(2)
Field type (in algorithm): REAL(8)
Dimensions: nlatbins,nflags
Units: K/day
Range: -10 to 10
Missing value: -999
Missing value operator: ==
Factor: 0.01
Offset: 0
MB: 0

Mean shortwave total atmospheric radiative heating rate for each latitude/status flag bin.

(46) Standard deviation of atmospheric shortwave heating

Name in file: SigmaQSW
Source: 2B-FLXHR-LIDAR 008
Field type (in file): INT(2)
Field type (in algorithm): REAL(8)
Dimensions: nlatbins,nflags
Units: K/day
Range: -10 to 10
Missing value: -999
Missing value operator: ==
Factor: 0.01
Offset: 0
MB: 0

Standard deviation of total atmospheric shortwave radiative heating rate over each latitude/status flag bin.

(47) Solar Zenith Angle

Name in file: Solar_zenith_angle
Source: 2B-FLXHR-LIDAR 008
Field type (in file): INT(2)
Field type (in algorithm): REAL(8)
Dimensions: nray
Units:
Range: to
Missing value: -999
Missing value operator: ==
Factor: 0.1
Offset: 0
MB: 0.069

Solar zenith angle used in SW flux calculations.

(48) Land Characteristic

Name in file: Land_Char
Source: 2B-FLXHR-LIDAR 008
Field type (in file): INT(1)
Field type (in algorithm): INT(1)
Dimensions: nray
Units:
Range: 1 to 18
Missing value: -999
Missing value operator: ==
Factor: 1
Offset: 0
MB: 0.035

1 - Evergreen Needle Forest
2 - Evergreen Broad Forest
3 - Deciduous Needle Forest
4 - Deciduous Broad Forest
5 - Mixed Forest
6 - Closed Shrubland
7 - Open Shrubland
8 - Woody Savannas
9 - Savannas
10 - Grasslands
11 - Perm. wetlands
12 - Croplands
13 - Urban & built-up
14 - Cropland mosaics
15 - Snow/Ice
16 - Barren/Sparse Veg.
17 - Water Bodies
18 - Tundra

(49) Visible Albedo

Name in file: Albedo
Source: 2B-FLXHR-LIDAR 008
Field type (in file): REAL(4)
Field type (in algorithm): REAL(4)
Dimensions: nray
Units:
Range: 0 to 10
Missing value: -999
Missing value operator: ==
Factor: 1
Offset: 0
MB: 0.139

Albedo of surface in visible -> 0.65 um

(50)

Name in file: FlagCounts	**Range:** to
Source: 2B-FLXHR-LIDAR 008	**Missing value:**
Field type (in file): INT(4)	**Missing value operator:**
Field type (in algorithm): INT(4)	**Factor:** 1
Dimensions: 20	**Offset:** 0
Units:	**MB:** 0

Occurrances of each status flag

4. Changes Since the Last Product Version

4.1 2B-FLXHR-LIDAR 008

General product changes
None.

Field changes
Profile_time (source: 2B-GEOPROF 011):
None.
UTC_start (source: 2B-GEOPROF 011):
None.
TAI_start (source: 2B-GEOPROF 011):
None.
Latitude (source: 2B-GEOPROF 011):
None.
Longitude (source: 2B-GEOPROF 011):
None.
Height (source: 2B-GEOPROF 011):
None.
Range_to_intercept (source: 2B-GEOPROF 011):
None.
DEM_elevation (source: 2B-GEOPROF 011):
None.
Vertical_binsize (source: 2B-GEOPROF 011):
None.
Pitch_offset (source: 2B-GEOPROF 011):
None.
Roll_offset (source: 2B-GEOPROF 011):
None.
Data_quality (source: 2B-GEOPROF 011):
None.
Data_status (source: 2B-GEOPROF 011):
None.
Data_targetID (source: 2B-GEOPROF 011):
None.
FD:
11/30/2010 18:17:42 - Change factor to 10 (David Henderson)

FD_NC:
12/01/2010 16:16:31 - change factor to 10 (David Henderson)
12/07/2010 16:41:19 - Change name to NC = No cloud (David Henderson)
FD_NA:
11/30/2010 12:31:37 - Added field (David Henderson)
FU:
11/30/2010 18:17:21 - Change Factor to 10 (David Henderson)
FU_NC:
12/01/2010 16:16:11 - change factor to 10 (David Henderson)
12/07/2010 16:41:43 - Change name to NC = No Cloud (David Henderson)
FU_NA:
11/30/2010 12:29:32 - Added field (David Henderson)
QR:
None.
RH:
None.
TOACRE:
None.
BOACRE:
None.
Scene_status:
10/07/2011 16:50:00 - Changed flags description (David Henderson)
11/02/2011 16:11:04 - Changed RVOD_status_flxhr field name to Scene_status. (Phil Partain)
lidar_status:
None.
Status:
None.
BinCounts:
None.
Meansolar:
None.
Sigmasolar:
None.
MeanOSR:
None.
SigmaOSR:
None.
MeanSSR:
None.
SigmaSSR:
None.
MeanSFCR:
None.
SigmaSFCR:
None.
MeanOLR:
None.
SigmaOLR:
None.
MeanSLR:
None.

SigmaSLR:
None.
MeanSFCE:
None.
SigmaSFCE:
None.
MeanQLW:
None.
SigmaQLW:
None.
MeanQSW:
None.
SigmaQSW:
None.
Solar_zenith_angle:
08/18/2010 13:34:31 - Changed variable types (Tristan L'Ecuyer)
Land_Char:
12/07/2010 16:37:18 - Added field (David Henderson)
Albedo:
12/07/2010 16:39:29 - Added field (David Henderson)
12/10/2010 16:21:46 - change in code variable name (David Henderson)
12/10/2010 16:28:19 - changed in code name (David Henderson)
12/10/2010 17:15:39 - change type (David Henderson)
FlagCounts:
None.